

OF THE
IMPERFECTION
OF THE
Chymist's
DOCTRINE
OF
QUALITIES.

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OF THE

IMPERIAL

CHARTER

CLASSES

ROBERT

(3)

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OF
QUALITIES.

CHAP. I.

SINCE a great part of those Learned Men, especially Physicians, who have discerned the defects of the vulgar Philosophy, but are not yet come to understand and relish the *Corpuscularian*, have slid into the Doctrine of the Chymists; and since the Spagyrist is wont to pretend to make out all the Qualities of bodies from the Predominancy of some one of their three *Hypostatical*

4 *Imperfection of the Chymist's Principles*, I suppose it may both keep my opinion from appearing too presumptuous, and (which is far more considerable) may make way for the fairer Reception of the *Mechanical Hypothesis* about Qualities, if I here intimate (though but briefly and in general) some of those defects, that I have observed in Chymists Explanations of Qualities.

And I might begin with taking notice of the *Obscurity* of those Principles, which is no small defect in Notions whose proper office it should be to conduce to the illustration of others. For, how can that facilitate the understanding of an obscure Quality or Phenomenon which is it self scarcely intelligible, or at least needs almost as much explanation as the thing 'tis designed & pretended to explicate? Now a man need not be very conversant in the writings of Chymists to observe, in how Laxe, Indefinite, and almost Arbitrary Senses they employ the Terms of *Salt*, *Sulphur* and *Mercury*; of which I
could

could never find that they were agreed upon any certain Definitions or settled Notions; not onely differing Authors, but not unfrequently one and the same, and perhaps in the same Book, employing them in very differing senses. But I will not give the Chymists any rise to pretend, that the chief fault that I find with their Hypothesis is but verbal; though that it self may not a little blemish any Hypothesis, one of the first of whose Requisites ought to be *Clearness*; and therefore I shall now advance and take notice of defects that are manifestly of another kind.

And first the Doctrine that all their Theory is grounded on, seems to me *Inevident* and undemonstrated, not to say precarious. It is somewhat strange to me, that neither the Spagyrist themselves, nor yet their Adversaries, should have taken notice, that Chymists have rather supposed than evinced, that the Analysis of bodies by fire, or even that at least some *Analysis* is the onely instrument of in-

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vestigating what Ingredients mixt bodies are made up of, since in divers cases That may be discovered by Composition as well as by Resolution; as it may appear, that Vitriol consists of metalline parts (whether Martial, or Venereal, or both) associated by Coagulation with acid ones, one may, I say, discover this as well by making true Vitriol with Spirit (improperly called Oil) of Sulphur, or that of Salt, as by distilling or Resolving Vitriol by the fire.

But I will not here enlarge on this subject, nor yet will I trouble you with what I have largely discoursed in the *Sceptical Chymist*, to call in question the grounds on which Chymists assert, that all mixt bodies are compounded of *Salt*, *Sulphur*, and *Mercury*. For it may suffice me now to tell you, that, whatsoever they may be able to obtain from other bodies, it does not appear by Experience, which is the grand, if not the onely, Argument they rely on, that all mixt bodies that have Qualities, consist of
their

Doctrin of Qualities. 7

their *tria prima*, since they have not been able, that we know, truly, and without new Compositions, to resolve into those three, either *Gold*, or *Silver*, or *Crystal*, or *Venetian Talck*, or some other bodies, that I elsewhere name; & yet these bodies are endowed with divers *Qualities*, as the two former with Fusibleness and Malleability, and all of them with Weight and Fixity; so that in these and the like bodies, whence Chymists have not made it yet appear, that their Salt, Sulphur and Mercury, can be truly and adequately separated, 'twill scarce be other than precarious, to derive the malleableness, colour, and other *Qualities* of such bodies from those Principles.

Under this Head I consider also, that a great part of the Chymical Doctrin of Qualities is bottom'd on, or supposes, besides their newly questioned Analysis by fire, some other things, which, as far as I know, have not yet been well proved, and I question whether they ever will be.

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One of their main Suppositions is, that this or that Quality must have its *πρῶτον δεκτικόν*, as *Sennertus*, the Learnedst Champion of this opinion, calls it, or some particular material Principle, to the participation of which, as of the primary native and genuine subject, all other bodies must owe it : But upon this point having purposely discoursed elsewhere, I shall now only observe, that, not to mention Local motion and Figure, I think 'twill be hard to shew, what is the *πρῶτον δεκτικόν* of Gravity, Volatility, Heat, Sonorousness, Transparency and Opacity, which are Qualities to be indifferently met with in bodies whether simple or mixt.

And whereas the Spagyrist's are wont to argue, that, because this or that Quality is not to be derived truly from this or that particular Principle, as *Salt*, for instance, and *Mercury*; therefore it must needs be derivable from the third, as *Sulphur*. This way of arguing involves a farther Supposition than that newly examined.

For

Doctrine of Qualities. 9

For it implies, that every Quality in a compounded body must arise from some one of the *tria prima*, whereas experience assures us, that bodies may, by Composition, obtain Qualities, that were not to be found in any of the separate Ingredients. As we see in painting, that though blew and yellow be neither of them green, yet their mixture will be so. And though no single Sound will make an octave or *diapason*; yet two sounds, whose proportion is double, will have an eighth. And Tinn and Copper melted and mingled together in a due proportion, will make a bell-metal far more sonorous than either of them was before. 'Tis obvious enough for Chymists themselves to observe, that, though Lead be an insipid body, and Spirit of Vinegar a very sharp one, yet *saccharum Saturni*, that is compounded out of these two, has a sweetness that makes it not ill deserve its name.

But this ill-grounded Supposition of the Chymists, is extended farther
in

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in an usual Topic of theirs, according
to which they conclude, That I know
not how many Qualities, as well ma-
nifest as occult, must be explicated
by their *tria prima*, because they are
not explicable by the four elements
of the *Peripateticks*. To make which
argumentation valid, it must be pro-
ved, (which I fear it will never be)
that there are no other wayes, by
which those Qualities may be expli-
cated, but by a determinate number
of Material Principles, whether four
or three: Besides that, till they have
shewn that such Qualities may be in-
telligibly explicated by *their* Prin-
ciples, the objection will lye as strong
for the *Aristotelians* against them, as
for them against the *Aristotelians*.

CHAP. II.

NExt I consider, that there are
divers Qualities even in mixt
bodies, wherein it does not appear,
that the use of the Chymical Doctrine
is

Doctrine of Qualities. 11

is Necessary. As, for instance, when pure Gold is by Heat onely brought to fusion, and consequently to the state of fluidity, and upon the remission of that heat, grows a solid and consistent body again, what addition or expulsion or change of any of the *tria prima* does appear to be the cause of this change of consistence? Which is easie to be accounted for according to the *Mechanical* way, by the vehement agitation that the fire makes of the minute parts of the Gold to bring it to fusion; and the cohesion of those parts, by vertue of their gravity and fitness to adhere to one another, when that agitation ceases. When *Venice Glass* is meerly by being beaten to powder deprived of its Transparency and turned into a body opacous and white, what need or use of the *tria prima* have we in the explication of this Phænomenon? Or of that other which occurs, when by barely melting down this white and opacous body it is deprived of its opacity and colour, and becomes
diapha-

12 Imperfection of the Chymist's diaphanous? And of this sort of Instances you will meet with divers in the following Notes about particular Qualities; for which reason I shall forbear the mention of them here.

CHAP. III.

I Observe too, that the Spagyricall Doctrine of Qualities is *Insufficient* and too narrow to reach to all the Phænomena or even to all the notable ones, that ought to be explicable by them. And this Insufficiency I find to be two-fold; for, *first*, there are divers Qualities, of which Chymists will not so much as attempt to give us explications, and of other particular Qualities the explications, such as they are that they give us, are often very deficient and unsatisfactory; and do not sometimes so much as take notice of divers considerable Phænomena that belong to the Qualities whereof they pretend to give an account; of which you will

will meet with divers Instances in the ensuing Notes. And therefore I shall onely, (to declare my meaning the better,) invite you to observe with me, that though *Gold* be the body they affect to be most conversant with; yet it will be very hard to shew, how the specific weight of Gold can be deduced from any or all of the three Principles, since *Mercury* it self, that is of bodies, known to us, the heaviest next to Gold, is so much lighter than Gold, that, whereas I have usually found Mercury to be to an equal weight of water, somewhat, though little, less than fourteen to one, I find *pure* Gold to be about nineteen times as heavy as so much water. Which will make it very difficult, not to say impossible for them to explain, how Gold should barely by participating of Mercury, which is a body much lighter than it self, obtain that great specific gravity we find it to have; for the two other Hypostatical Principles, we know, are far lighter than Mercury. And I think

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think it would much puzzle the Chymists, to give us any examples of a compounded body, that is specifically heavier than the heaviest of the Ingredients that it is made up of. And this is the *first* kind of Insufficiency I was taking notice of in the Chymical Doctrine of Qualities.

The *other* is, That there are several bodies which the most Learned among themselves confess not to consist of their *tria prima*, and yet are indowed with Qualities, which consequently are not in those subjects to be explicated by the *tria prima* which are granted not to be found in them. Thus *elementary Water*, though never so pure, (as distilled Rain-water,) has fluidity and coldness and humidity and transparency and volatility, without having any of the *tria prima*. And the purest *Earth*, as Ashes carefully freed from the fixt salt, has gravity and consistence and dryness and colour and fixity, without owing them either to Salt, Sulphur, or Mercury; not to mention, that there are Cele-

Celestial bodies which do not appear, nor are wont to be pretended, to consist of the *tria prima*, that yet are indowed with Qualities. As the *sun* has Light, and as many Philosophers think, Heat, and Colour; and the *Moon* has a determinate consistence and figuration, (as appears by her mountains) and Astronomers observe, that the higher Planets and even the Fixt stars appear to be differently coloured. But I shall not multiply Instances of this kind, because what I have said, may not only serve for my present purpose, but bring a great Confirmation to what I lately said, when I noted, that the Chymical Principles were in many cases *not necessary* to explicate Qualities: For since in Earth, Water, &c. such diffused Qualities, as gravity, fixtness, colour, transparency and fluidity, must be acknowledged not to be derived from the *tria prima*; 'tis plain, that portions of matter may be endowed with such Qualities by other causes and agents than Salt, Sulphur

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Sulphur and Mercury. And then
why should we deny, that also in
compounded bodies those Qualities
may be (sometimes at least) produ-
ced by the same or the like Causes?
As we see, that the reduction of a
diaphanous Solid to powder, produ-
ces whiteness, whether the commi-
nution happens to Rock-crystal or
to Venice-glass, or to Ice : The first
of which is acknowledged to be a
natural and perfectly mixt body ; the
second a factitious and not onely
mixt but decomposed body ; and
the last, for ought appears, an ele-
mentary body, or at most very slight-
ly and imperfectly mixt. And so by
mingling Air in small portions with a
diaphanous Liquor, as we do when
we beat such a Liquor into foam, a
whiteness is produced, as well in pure
Water, which is acknowledged to be
a simple body, as in white Wine,
which is reckoned among perfectly
mixt bodies.

CHAP.

CHAP. IV.

I Further observe, that the Chymists Explications do not reach deep, and far enough. For *first*, most of them are not sufficiently distinct and full, so as to come home to the particular *Phænomena*, nor often times so much as to all the grand ones, that belong to the History of the Qualities they pretend to explicate. You will readily believe, that a Chymist will not easily make out by his Salt, Sulphur, and Mercury, why a Load-stone capp'd with steel may be made to take up a great deal more Iron, sometimes more than eight or ten times as much, than if it be immediately applied to the iron; or why, if one end of the Magnetic Needle is dispos'd to be attracted by the North-pole, for instance, of the Load-stone, the other Pole of the Load-stone will not attract it but drive it away; or, why a bar or rod of iron, being heated red-hot and cooled perpendi-

B cularly,

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cularly, will with its lower end drive
away the flower de Luce, or the
North-end of a Marriners Needle,
which the upper end of the same bar
or rod will not repell but draw to it.
In short, of above threescore Pro-
perties or notable Phænomena of
Magnetic Bodies, that some Writers
have reckon'd up, I do not remember
that any three have been by Chymists
so much as attempted to be solved by
their three Principles. And even in
those Qualities, in whose explicati-
ons these Principles may more pro-
bably than elsewhere pretend to have
a place, the Spagyrist's accounts are
wont to fall so short of being distinct
and particular enough, that they use
to leave divers considerable *Phæno-
mena* untouch'd, and do but very
lamely or slightly explicate the more
obvious or familiar. And I have so
good an opinion of divers of the em-
bracers of the Spagyrical Theory of
Qualities (among whom I have met
with very Learned and worthy men)
that I think, that if a Quality being
pro-

pos'd to them, they were at the same time presented with a good Catalogue of the Phænomena, that they may take, in the History of it, as it were with one view, they would plainly perceive that there are more particulars to be accounted for, than at first they were aware of; and divers of them such, as may quite discourage considering men from taking upon them to explain them all by the *Tria prima*, and oblige them to have recourse to more Catholic and comprehensive Principles. I know not, whether I may not add on this occasion, that, methinks, a Chymist, who by the help of his *Tria Prima*, takes upon him to interpret that Book of Nature of which the Qualities of bodies make a great part, acts at but a little better rate than he, that seeing a great book written in a Cypher, whereof he were acquainted but with three Letters, should undertake to decypher the whole piece. For though 'tis like, he would in many words find one of the Letters of his

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short key, and in divers words two
of them, and perhaps in some all
three; yet, besides that in most of
the words wherein the known Letter
or Letters may be met with, they
may be so blended with other unknown
Letters as to keep him from decyphering
a good part of those very words,
tis more than probable, that a great
part of the book would consist of words
wherein none of his three Letters were
to be found.

CHAP. V.

AND this is the *first* account, on
which I observe that the Chymical
Theory of Qualities does not reach
far enough: But there is *another*
branch of its deficiency. For even,
when the explications seem to come
home to the Phænomena, they are
not primary, and, if I may so speak,
Fontal enough. To make this
ap-

appear, I shall at present imploy but these two Considerations. The *first* is, that those substances themselves, that Chymists call their Principles, are each of them indowed with several Qualities. Thus *salt* is a consistent, not a fluid, body; it has its weight, 'tis dissoluble in water, is either diaphanous or opacous, fixt or volatile, *sapid or insipid*; (I speak thus disjunctively, because Chymists are not all agreed about these things; and it concerns not my Argument, which of the disputable Qualities be resolved upon.) And *sulphur*, according to *them*, is a body fusible, inflammable, &c. and, according to Experience, is consistent, heavy, &c. So that 'tis by the help of more primary and general Principles, that we must explicate some of those Qualities, which being found in bodies, supposed to be perfectly similar or homogeneous, cannot be pretended to be derived in one of them from the other. And to say, that 'tis the nature of a Principle to have this or that

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Quality, as, for instance, of Sulphur to be fusible, and therefore we are not to exact a Reason why it is so; though I could say much by way of answer, I shall now only observe, that this Argument is grounded but upon a supposition, and will be of no force, if from the primary affections of bodies one may deduce any good Mechanical Explication of Fusibility in the general, without necessarily supposing such a Primigeneal Sulphur, as the Chymists fancy, or deriving it from thence in other bodies. And indeed, since not only Salt-peter, Sea salt, Vitriol and Allum, but Salt of Tartar, and the Volatile Salt of Urine are all of them fusible; I do not well see, how Chymists can derive the fusibleness even of Salts obtained by their own *analysis* (such as Salt of Tartar and of Urine) from the participation of the Sulphureous Ingredient; especially since, if such an attempt should be made, it would overthrow the *Hypothesis* of three Simple bodies, whereof they will have all
mixt

mixt ones to be compounded; and still 'twould remain to be explicated, upon what account the Principle, that is said to endow the other with such a Quality, comes to be endowed therewith it self. For 'tis plain, that a mass of Sulphur is not an Atomical or Adamantine body; but consists of a multitude of Corpuscles of determinate Figures, and connected after a determinate manner: so that it may be reasonably demanded, why such a Convention of particles, rather than many another that does not, constitutes a fusible body.

CHAP. VI.

AND this leads me to a further Consideration, which makes me look upon the Chymists explications as not deep and radical enough; and it is this, that, when they tell us, for instance, that the fusibleness of bodies proceeds from Sulphur, in case they say true, they do but tell us *what* material Ingredient 'tis that being mingled with and dispers'd through the other parts of a body, makes it apt to melt: But this does not intelligibly declare, *what it is* that makes a portion of matter fusible, and *how* the sulphureous Ingredient introduces that disposition into the rest of the mass, wherewith 'tis commixt or united. And yet 'tis such explications as these, that an inquisitive Naturalist chiefly looks after, and which I therefore call *Philosophical*. And to shew, that there may be more Fontal explications, I shall only ob-

observe, that, not to wander from our present instance, Sulphur it self is fusible. And therefore, as I lately intimated, Fusibility, which is not the Quality of one Atome, or Particle, but of an Aggregate of Particles, ought it self to be accounted for in that Principle, before the Fusibleness of all other bodies be derived from it. And 'twill in the following notes appear, that in *Sulphur* it self that Quality may be probably deduced from the convention of Corpuscles of determinate shapes and sizes, contexed or connected after a convenient manner. And if either nature, or art, or chance, should bring together particles endowed with the like Mechanical Affections, and associate them after the like manner, the resulting body would be fusible, though the component particles had never been parts of the Chymists primordial sulphur: And such particles so convening might perhaps have made Sulphur it self, though before there had been no such body in the world,

26 Imperfection of the Chymist's world. And what I say to those Chymists, that make the sulphureous Ingredient the cause of fusibility, may easily, *mutatis mutandis*, be applied to their Hypothesis, that rather ascribe that quality to the Mercurial or the Saline Principle, and consequently cannot give a rational account of the fusibility of Sulphur. And therefore though I readily allow (as I shall have afterwards occasion to declare) that Sulphur, or an other of the *tria prima*, may be met with, and even abound in several bodies endowed with the quality that is attributed to their participation of that Principle; yet that this may be no certain sign that the propos'd Quality must flow from that Ingredient, you may perhaps be assisted to discern by this illustration, That if Tin be duly mixt with Copper or Gold, or, as I have tried, with Silver or Iron, it will make them very brittle; and it is also an Ingredient of divers other bodies that are likewise brittle, as blew, green, white, and otherwise colour'd, Amels, which

which are usually made of calcin'd Tin (which the Tradesmen call *Puttee*,) colliquated with the Ingredients of Crystal-glass and some small portion of Mineral pigment. But though in all the above-named brittle bodies, Tin be a considerable Ingredient; yet 'twere very unadvised to affirm, that Brittleness in general proceeds from Tin. For provided the solid parts of consistent bodies touch one another but according to small portions of their surfaces, and be not implicated by their contexture, the Metalline or other Composition may be brittle, though there be no Tin at all in it. And in effect, the materials of glass being brought to fusion will compose a brittle body, as well when there is no Puttee colliquated with them, as when there is. Calcin'd Lead by the action of the fire may be melted into a brittle mass, and even into transparent Glass, without the help of Tin or any other additament. And I need not add, that there are a multitude of other bodies, that cannot be pretend-
ed

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ed to owe their brittleness to any participation of Tin, of which they have no need, if the matter they consist of wants not the requisite Mechanical Dispositions.

And here I shall venture to add, that the way employed by the Chymists, as well as the Peripateticks, of accounting for things by the Ingredients, whether Elements, Principles, or other bodies, that they suppose them to consist of, will often frustrate the Naturalists expectation of events, which may frequently prove differing from what he promis'd himself, upon the Consideration of the Qualities of each Ingredient. For the ensuing Notes contain divers Instances, wherein there emerges a new Quality differing from, or even contrary to, any that is conspicuous in the Ingredients; as two transparent bodies may make an opacous mixture, a yellow body and a blew, one that is green, two malleable bodies, a brittle one, two actually cold bodies, a hot one,

one, two fluid bodies, a consistent one, &c. And as this way of judging by material Principles hinders the foreknowledge of Events from being certain; so it much more hinders the assignation of Causes from being satisfactory; so that perhaps some would not think it very rash to say, that those who judg of all mixt bodies as Apothecaries do of Medicines, barely by the Qualities and Proportions of the Ingredients (such as among the *Aristotelians* are the four Elements, and among the Chymists the *tria prima*,) do, as if one should pretend to give an account of the Phænomena and operations of Clocks and Watches, and their Diversities by this, That some are made of brass wheels, some of iron, some have plain ungilt wheels, others of wheels overlaid with Gold, some furnished with gut-strings, others with little chains, &c. and that therefore the Qualities and Predominancies of these metalls that make parts of the Watch, ought to have ascribed to them, what indeed flows

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flows from their Coordination and
Contrivance.

CHAP. VII.

THE *last* defect I observe in the
Chymical Doctrine of Quali-
ties, is, that in many cases it agrees not
well with the Phænomena of Nature,
and that by one or both of these ways.
First, there are divers changes of
Qualities, wherein one may well ex-
pect, that a Chymical Principle should
have a great stroak, and yet it does
not at all appear to have so. He that
considers, what great operations di-
vers of the Hermeticks ascribe to
this or that Hypostatical Principle,
and how many Qualities according
to them must from it be derived, can
scarce do other than expect, that a
great change as to those Qualities
happening in a mixt body, should at
least be accompany'd with some no-
table action *of*, or alteration *in* the
Prin-

Principle. And yet I have met with many instances, wherein Qualities are produced, or abolished, or very much altered, without any manifest introduction, expulsion, or considerable change of the Principle, whereon *that* Quality, is said to depend, or perhaps of either of the two *others*: As when a piece of fine silver, that having been neald in the fire, and suffer'd to cool leisurely, is very flexible, is made stiff and hard to bend, barely by a few stroaks of a hammer. And a string of a Lute acquires or loses a sympathy, as they call it, with another string of the same or another Instrument, barely by being either stretch'd so as to make an Unison with it, or screw'd up or let down beyond or beneath that degree of Tension.

To multiply instances of this kind would be to anticipate those, you will hereafter meet with in their due places. And therefore I shall pass on from the first sort of *Phænomena*, that favour not the Chymical Hypothesis about

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about Qualities, to the other which
consists of those, wherein either that
does not happen which according to
their Hypothesis ought to happen, or
the contrary happens to what accord-
ing to their Hypothesis may justly be
expected. Of this you will meet with
instances hereafter ; I shall now trou-
ble you but with one, the better to
declare my meaning. 'Tis not un-
known to those Chymists, that work
much in Silver and in Copper, that
the former will endure Ignition and
become red-hot in the fire, before it
will be brought to fusion ; and the
latter is yet far more difficult to be
melted down than the other ; yet if
you separately dissolve those two
metalls in *Aqua fortis*, and by evapo-
ration reduce them to Crystals,
these will be brought to fusion in a
very little time, and with a very mo-
derate Heat, without breaking the
glasses that contain them. If you
ask a vulgar Chymist the cause of
this facility of fusion, he will proba-
bly tell you without scruple, that 'tis
from

from the saline parts of the *Aqua fortis*; which, being imbodyed in the metals and of a very fusible nature, impart that easiness of fusion to the metals they are mixt with. According to which plausible explication one might well expect, that, if the saline Corpuscles were exquisitely mingled with Tin, they would make it far more fusible than of it self it is. And yet, as I have elsewhere noted, when I put Tin into a convenient quantity of *Aqua fortis*, the metal being corroded, subsided, as is usual, in the form of whites of eggs, which being well dried, the Tinn was so far from being grown more fusible by the addition of the saline particles of the *Menstruum*, that, whereas 'tis known that simple Tin will melt long before it come to be red-hot, this prepar'd Tin would endure for a good while not only a thorow ignition, but the blast of a pair of double bellows, (which we usually imploy'd to melt Silver and Copper it self,) without being at all brought to fusion. And

C

as

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as for those Spagyrist's that admit, as most of them are granted to do, that all kinds of metals may be turned into Gold by a very small proportion of what they call the Philosophers *Elixir*, one may I think shew them from their own concessions, that divers Qualities may be changed even in such constant bodies as Metals, without the addition of any considerable proportion of the simple Ingredients, to which they are wont to ascribe those Qualities; provided the Agent, (as an efficient rather than as a material Cause,) be able to make a great change in the Mechanical affections of the parts whereof the metal it acts on is made up. Thus if we suppose a pound of Silver, a pound of Lead, and a pound of Iron to be transmuted into Gold, each by a grain of the powder of projection, this tinging powder, as a material Cause is inconsiderable, by reason of the smallness of its bulk, and as an efficient cause it works differing and even contrary effects, according to the disposition,

position, wherein it finds the metal to be transmuted, and the changes it produces in the constituent Texture of it. Thus it brings Quick-silver to be fixt, which it was not before, and deprives it of the Fluidity which it had before; it brings Silver to be indissoluble in *Aqua fortis*, which readily dissolved it before, and dissoluble in *Aqua Regis*, which before would not touch it; and which is very considerable to our present purpose, whereas it makes Iron much more fusible than *Mars*, it makes Lead much less fusible than whilst it retained its pristine form, since *Saturn* melts ere it come to ignition, which Gold requires to bring it to fusion. But this is proposed only as an Argument *ad hominem*, till the Truth of the transmutation of metals into Gold, by way of projection, be sufficiently proved, and the circumstances and phenomena of it particularly declared.

I must not forget to take notice, that some learned modern Chymists would be thought to explicate divers

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of the Changes that happen to Bodies
in point of Odours, Colours, &c. by
saying that in such alterations the Sul-
phur or other Hypostatical Principle
is *intraverted* or *extraverted*, or, as o-
thers speak, *inverted*. But I confess,
to me these seem to be rather new
terms than real explications. For, to
omit divers of the Arguments men-
tioned in this present Treatise, that
may be applied to this way of solving
the Phenomena of Qualities, one may
justly object, that the supposed Ex-
traversion or Intraversion of Sulphur
can by no means reach to give an ac-
count of so great a variety of Odours,
Colours, and other Qualities as may
be found in the changed portions of
matter we are speaking of. And
which is more, what they call by these
and the like names, cannot be done
without Local motion transposing the
particles of the matter, and conse-
quently producing in it a change of
Texture, which is the very thing we
would infer, and which being suppo-
sed, we may grant Sulphur to be often-
times

times actually present in the altered Bodies, without allowing it to be always necessary to produce the alterations in them, since Corpuscles so condition'd and contex'd would perform such Effects, whether Sulphur, as such, did, or did not, make up the subject-matter of the Change.

And now I shall conclude, and partly recapitulate what has been delivered in this and the two foregoing Chapters, with this summary consideration, That the Chymist's Salt, Sulphur and Mercury themselves are not the first and most simple Principles of Bodies, but rather primary Concretions of Corpuscles or Particles more simple than they, as being endowed only with the first, or most radical (if I may so speak) and most Catholick Affections of simple Bodies, namely Bulk, Shape, and Motion, or Rest; by the different Conventions or Coalitions of which minutest portions of matter are made those differing Concretions that Chymists name Salt, Sulphur and

§§ Imperfection of the Chymist's Mercury. And to this Doctrine it will be consonant, that several Effects of this or that Spagyric Principle need not be derived from Salt, for instance, or Sulphur as such, but may be explained by the help of some of those Corpuscles that I have lately call'd more Simple and Radical; and such Explications being more simple and Mechanical, may be thought upon that score more fundamental and satisfactory.

CHAP. VIII.

I Know it may be objected in favour of the Chymists, that as their Hypostatical Principles, Salt, Sulphur and Mercury, are but three, so the Corpuscularian Principles are but very few; and the chief of them *Bulk*, *Size*, and *Motion*, are but three neither; so that it appears not why the Chymical Principles should be more

more barren than the Mechanical. To which allegation I answer, that, besides that these last nam'd Principles are more numerous, as taking in the Posture, Order, and Scituation, the Rest, and, above all, the almost infinitely diversifiable Contextures of the small parts, and the thence resulting structures of particular bodies, and fabrick of the world: Besides this, I say, each of the three Mechanical Principles, specified in the objection, though but one in name, is equivalent to many in effect; as *Figure*, for instance, comprehends not only Triangles, Squares, Rhombusses, Rhomboids, Trapezions, and a multitude of Polygons, whether ordinate or irregular; but, besides Cubes, Prismes, Cones, Spheres, Cylinders, Pyramids, and other Solids of known Denominations, a scarce numerable multitude of hooked, branched, Eel-like, screw-like, and other irregular bodies; whereof though these, and some others, have distinct appellations, yet the greatest

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part are nameless; so that it need be no wonder, that I should make the Mechanical Principles so much more fertile, that is, applicable to the production and explication of a far greater number of *Phænomena*, than the *Chymical*; which, whilst they are considered but as similar bodies, that are Ingredients of mixt and compounded ones, are chiefly variable but by the greater or lesser quantity that is employed by Nature or Art to make up the mixt body. And Painters observe, that Black and White, though mixt in differing Proportions, will still make but lighter and darker grays. And if it be said, that these Ingredients, by the Texture resulting from their mixtures, may acquire Qualities that neither of them had before; I shall answer, that, to alledge this, is in effect to confess, that they must take in the *Mechanical* Principles, (for to them belongs the Texture or Structure of bodies) to assist the *Chymical* ones. And on this occasion, to borrow an illustration from

from

from our unpublished *Dialogue of the Requisites of a good Hypothesis*, I shall add, that a Chymist that should pretend, that because his three Principles are as many as those of the Corpuscularians, they are as sufficient as these to give an account of the Book of Nature, methinks, I say, he would do like a man that should pretend, that with four and twenty words he would make up a language as well as others can with the four and twenty Letters of the Alphabet, because he had as many words already formed, as they had of bare Letters; not considering that instead of the small number of variations that can be made of his words by Prepositions and Terminations, the Letters of the Alphabet being variously combined, placed and reiterated, can be easily made to compose not only his four and twenty words, with their variations, but as many others as a whole language contains.

CHAP. IX.

NOTwithstanding all that I have been obliged to say to the Disadvantage of the Chymical Principles, in reference to the Explication of Qualities, I would not be thought to grant, that the *Peripateticks* have reason to triumph, as if their four Elements afforded a better Theory of Qualities. For, if I had, together with leisure enough to perform such a Task, any obligation to undertake it, I presume, it would not be difficult to shew, that the *Aristotelian* Doctrine about particular Qualities is liable to some of the same Objections with the Chymical, and to some others no less considerable; and that, to derive all the *Phænomena* their Doctrine ought to solve from *Substantial Forms* and *real Qualities Elementary*, is to impose on us a Theory more barren and precarious than that of the Spagyrist.

That

That to derive the particular Qualities of bodies from those Substantial Forms, whence the Schools would have them to flow, is but an insufficient and unfit way of accounting for them, may appear by this, that *Substantial Forms* themselves are things, whose existence many Learned Philosophers deny, whose Theory many of them think Incomprehensible, and the most Candid and Judicious of the *Peripateticks* themselves confess it to be very abstruse; so that from such doubtful and obscure Principles we can hardly expect clear Explications of the nature and *Phænomena* of Qualities; not to urge, that the *Aristotelian* Definitions, both of Qualities in general, and of divers of the more familiar Qualities in particular, as Heat, Cold, Moisture, Diaphaneity, &c. are far enough from being clear and well framed, as we elsewhere have occasion to shew.

Another thing, which makes the Scholastic Doctrine of Qualities unsatisfactory, is, that it seldom so much

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as attempts to teach the Manner how
the Qualities themselves and their
Effects or Operations are produced.
Of this you may elsewhere find an
Instance given in the Quality that is
wont to be first in the list, viz that of
Heat, which though it may intelligi-
bly and probably be explicated by the
Corpuscular Hypothesis, yet in the
Peripatetic account that is given of it,
is both too questionable and too su-
perficial to give much Content to a
Rational Inquirer. And indeed to say,
that a *Substantial Form* (as that of the
Fire) acts by a Quality (call'd *Heat*)
whose Nature 'tis to produce such an
effect (as to soften Wax or harden
Clay) seems to be no other in sub-
stance, than to say, that it produces
such an effect by some power it has
to produce it. But what that power
is, and how it operates, is that, which,
though we most desire to know, we
are left to seek. But to prosecute the
Imperfections of the *Peripatetic Hypothesis*,
were to intrench upon another
discourse, where they are more
fully

fully laid open. And therefore I shall now but lightly glance upon a couple of imperfections, that more particularly relate to the Doctrine of Qualities.

And first I do not think it a Convincing Argument that is wont to be imployed by the *Aristotelians* for their *Elements*, as well as by the *Chymists* for their *Principles*, that, because this or that Quality, which they ascribe to an Element or a Principle, is found in this or that body, which they call mixt, therefore it must owe that Quality to the participation of that Principle or Element. For, the same Texture of parts or other modification of matter may produce the like Quality in the more simple and the more compounded body, and they may both separately derive it from the same Cause, and not one from the Participation of the other. So Water and Earth and Metals and Stones, &c. are heavy upon the account of the common Cause of Gravity, and not because the rest partake
of

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of the Earth; as may appear in Ele-
mentary water, which is as simple a
body as it, and yet is heavy: So wa-
ter and oil, and exactly deflegm'd Spi-
rit of Wine, and Mercury, and also
Metals and Glass of Antimony, and
Minium or calcin'd Lead, whilest these
three are in fusion are fluid, being
made so by the variously determined
motions of their minute parts and o-
ther Causes of Fluidity, and not by
the participation of water, since the
arid *Calces* of Lead and Antimony
are not like to have retained in the
fire so volatile a liquor as water, and
since Fluidity is a Quality that Mer-
cury enjoys in a more durable man-
ner than Water it self: For that me-
talline liquor, as also Spirit of Wine
well Rectified, will not be brought to
freeze with the highest degree of
Cold of our sharpest winters, though
a far less degree of Cold would make
water cease to be fluid and turn it into
Ice.

To this I shall only add (in the se-
cond place,) that 'tis not unpleasant
to

to see, how arbitrarily the *Peripateticks* derive the Qualities of bodies from their four Elements, as if, to give an instance in the lately named Quality, *Liquidity*, you shew them exactly deflegmed Spirit of Wine, and ask them, whence it has its great Fluidness, they will tell you from water, which yet is far less fluid than it, and this spirit of wine it self is much less so than the flame into which the spirit of wine is easily resolvable. But if you ask, whence it becomes totally inflammable, they must tell you, from the fire; and yet the whole body, at least as far as sense can discover, is fluid, and the whole body becomes flame, (and then is most fluid of all;) so that fire and water as contrary as they make them, must both be by vast odds predominant in the same body. This spirit of wine also, being a liquor whose least parts that are sensible are actually heavy, and compose a Liquor which is seven or eight hundred times as heavy as Air of the same bulk, which yet experience shews

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shews not to be devoid of weight,
must be supposed to abound with
Earthy particles, and yet this spiri-
tuous liquor may in a trice become
Flame, which they would have to be
the lightest body in the world.

But, to enlarge on this subject,
would be to forget, that the design
of this Tract engages me to deal not
with the *Peripatetic* School, but the
spagyric. To which I shall there-
fore return, and give you this ad-
vertisement about it, that what I
have hitherto objected is meant a-
gainst the more common and receiv-
ed Doctrine about the Material Prin-
ciples of bodies reputed mixt, as 'tis
wont by vulgar Chymists to be ap-
plied to the rendring an account of
the Qualities of substances Corpo-
real; and therefore I pretend not,
that the past objections should con-
clude against other Chymical Theo-
ries than that which I was concern-
ed to question. And if *adept* Philo-
sophers, (supposing there be such) or
any

any other more than ordinarily Intelligent Spagyrist, shall propose any particular Hypotheses, differing from those that I have questioned, as their Doctrine and Reasons are not yet known to me ; so I pretend not that the past Arguments should conclude against them, and am willing to think, that Persons advantaged with such peculiar opportunities to dive into the Mysteries of Nature, will be able to give us, if they shall please, a far better account of the Qualities of bodies than what is wont to be proposed by the generality of Chymists.

Thus, dear *Pyrophilus*, I have laid before you some of the chief Imperfections I have observed in the vulgar Chymists Doctrine of Qualities, and consequently I have given you some of the chief Reasons that hinder me from acquiescing in it. And as my objections are not taken from the Scholastical subtleties nor the doubtful speculations of the Peripateticks or other Adversaries of the

D Her-

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Hermetick Philosophy, but from the
nature of things and from Chymical
experiments themselves; so I hope,
if any of your Spagyricall friends have
a minde to convince me, he will at-
tempt to doe it by the most proper
way, which is, by actually giving us
clear and particular explications, at
least of the grand *Phænomena* of Qua-
lities; which, if he shall do, he will find
me very ready to acquiesce in a Truth
that comes usher'd in, and endear'd by
so acceptable and useful a thing, as a
Philosophical Theory of Qualities.

FINIS.

